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TOSHIBA AMERICA INFORMATION SYSTEMS
STORAGE DEVICE DIVISION
IRVINE, CALIFORNIA

SD-R6472

DVD REWRITEABLE MOBILE DRIVE

USER MANUAL

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INTRODUCTION – SD-R6472

General Features

Reads and records digital data on DVD-R/-RW, DVD+R/+RW and CD-R/-RW discs..

	Read	Write
DVD-R/+R	8X	8X
DVD-RW/+RW	6X	4X
DVD-ROM	8X	n/a
DVD-RAM	2X	n/a
CD-ROM	24X	n/a
CD-R	24X	24X
CD-RW	24X	4X
HS CD-RW	-	10X
US CD-RW	-	10X

3-way Disc Eject (eject button, software, emergency eject hole)

Average Random Access Time

CD:	105ms
DVD-RAM:	250ms
DVD-ROM	120ms

Horizontal or Vertical Mount
2MByte Buffer
Playback interchangeability for CD-ROM and DVD-ROM discs
Regionalization (RPC2 compliance) (DVD)

BUS Interface ATAPI

Types of Disc Formats Supported - Write

Applicable Write Format

DVD-R	Disc at once, incremental write
DVD-RW	Disc at once, incremental write, restricted overwrite
DVD+R	Sequential Recording
DVD+RW	Sequential Recording, Random Write
CD-R/-RW	Disc at once, Track at once, Session at once, Packet write

Applicable Write disc

DVD-R	DVD-R (Ver 2.0 & Ver 2.1 for General),
DVD-RW	DVD-RW (Ver 1.1 & Ver 1.2)
DVD+R	DVD+R (4.7GB basic Format spec Ver. 1.3)
DVD+RW	DVD+RW (4.7GB basic Format spec Ver. 1.2)
CD-R/-RW HS CD-RW US CD-RW	CD-DA, CD+(E)G, CD-MIDI, CD-ROM, CD-ROM XA, MIXED MODE CD, CD-I, CD-I Bridge (Photo-CD, Video-CD), Multi-session CD (Photo-CD, CD-EXTRA, Portfolio)

Types of Disc Formats Supported - Read

DVD:

DVD-ROM (DVD-5, DVD-9, DVD-10, DVD-18)

DVD-R (Ver 1.0 for Authoring, Ver. 2.0 & Ver. 2.1 for General)

DVD-RW (Ver 1.1, 1.2)

DVD+R (4.7GB Basic Format spec. Ver. 1.3)

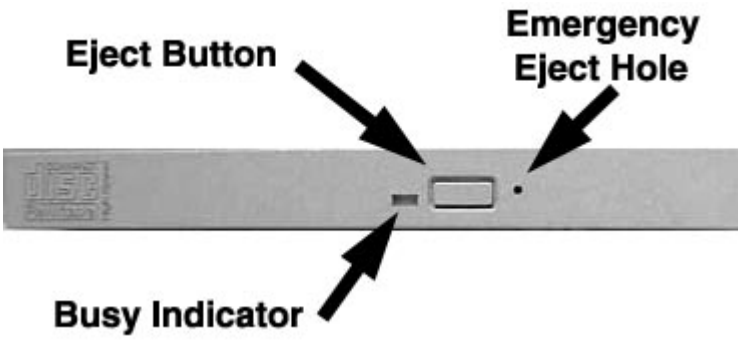
DVD+RW (Ver 1.2), DVD-RAM (Ver 2.1)

CD:

CD-DA, CD+(E)G, CD-MIDI, CD-TEXT, CD-ROM, CD-ROM XA, CD-I, CD-I Bridge (Photo-CD, Video-CD), Multi-session (Photo-CD, CD-EXTRA, CD-R, CD-RW, Portfolio)

Front Panel

Figure 1.SD-R6472 DVD Writeable Drive Front Panel



Loading Tray	Load disc using tray.
Busy Indicator	The LED lights green or amber when the drive is operating (LED is amber when drive is writing.)
Eject Button	The Eject button is used to open the disc tray so you can install or remove a disc.
Emergency Eject Hole	The emergency eject hole is to be used only when the Loading Tray will not open when Eject button is pressed.

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SETUP – SD-R6472

Toshiba recommends that only trained professionals install this DVD Rewriteable drive into your laptop/notebook.

Installation Notes

- The SD-R6472 DVD Rewriteable drive has no jumpers that need to be set
- Mounting orientation: 15° (horizontally), 15° vertically (volume control in down position), 30° (drive with volume control in up position).
- When mounting drive use 4 M2-PO.4 tapping holes located on the left and right sides of drive.
- When mounting drive, the tightening torque of the four screws must be even. Recommended screw tightening torque is 2N
- For clearance around the front bezel, it is recommended that a clearance of more than 0.8mm should be left in all directions.

Software Driver

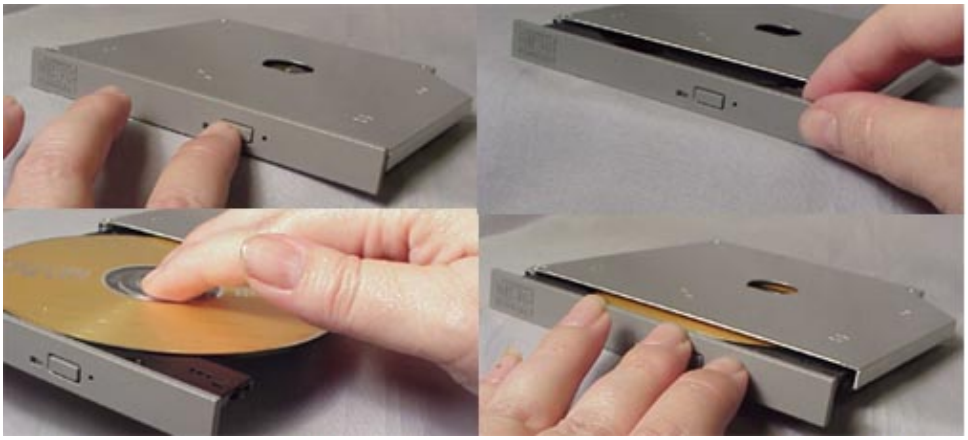
Toshiba's SD-R6472 drive does not require any unique device drivers for Windows '98/2000/XP/NT. After installing your drive and re-booting, your system should recognize your drive. Win '98/2000/XP/NT Operating Systems support all Toshiba's ATAPI drives natively. If you prefer using DOS, download the ATAPI driver from our web site.

USING THE DVD REWRITEABLE DRIVE – SD-R6472

Drive Operation

Inserting Media

To insert media perform the following steps:



1. ***Figure 1.Inserting Disc***

1. Open the drive's loading tray by pressing the Eject Button and pulling out the tray.
2. Place media disc into drive's loading tray, and lightly press down on the inner portion of the disc.
3. Gently close the disc tray.

Removing Media

To remove media disc from the drive, perform the following steps:

1. Open the loading tray by pressing the Eject Button, and pulling tray out.
2. Grasp disc by it's outer edge, and lift out of loading tray.
3. Gently close the loading tray.

Usage Guidelines

- Keep the disc tray closed when not using the DVD Rewriteable drive
- Do not press down on the disc tray when opening or closing it.
- Do not place objects on the disc tray
- Never use a damaged, broken, or deformed disc
- Do not press the Eject button while the drive is accessing a disc

Emergency Ejection

CAUTION: The following procedure is intended only as a last resort when pressing the eject button fails to open the Loading Tray.

1. Turn computer power OFF by properly shutting down system.
2. Insert a solid bar (i.e. large paper clip) into Emergency Eject hole and push in as shown in the picture below.
3. Loading tray will open/eject.

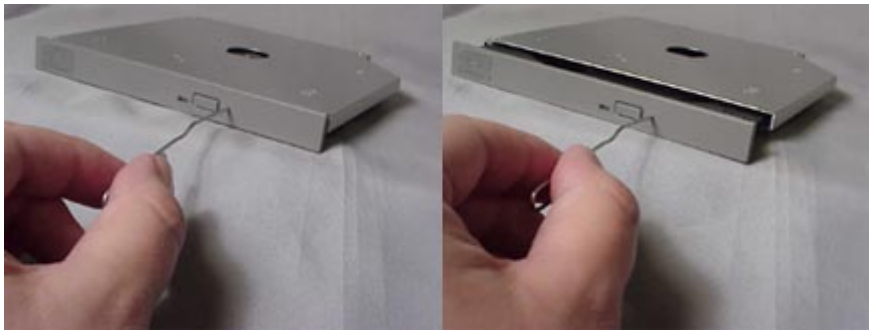


Figure 2.Using Emergency Eject

Handling Media

CD/DVD media is sensitive to dust and fingerprints. Carefully handle media by its edges only.

Cleaning Media

Try to avoid touching the read area (underside) of the disc as dirt and smears will degrade the disc accessing speed.
If the disc becomes dirty wipe it with a damp soft cloth. Avoid cleaning in a circular motion, but rather from the inner side outward.

NOTE: High-speed drives spin the disc at a high rotational speed. If a disc has printing on only half of the disc, or if there is a slight imbalance in the disc, the imbalance is greatly magnified by the high speed, causing the drive to vibrate or produce a fan-like noise. These effects are inherent in the high-speed technology and do not indicate a problem with the drive.

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TROUBLESHOOTING – SD-R6472

Problem	Solution
Disc tray cannot be opened	• Check that there is power to drive. • Use Emergency Eject instructions to open tray.
Drive is not recognized by system	• Is the drive connected properly? Are all cables plugged in properly (e.g. Power Cable, Interface Cable and Audio Cables). • Is the software driver loaded? On a step-by-step (F8) Boot of the system is the DVD Rewriteable drive recognized? (BIOS / DOS reports "device driver not found" or "no valid drivers selected."). If not, Contact Technical Support. • Has the DVD Rewriteable drive software driver been corrupted by a virus. Run a Virus Scan program and repair if possible. Contact Technical Support if the Virus renders the DVD Rewriteable drive software drivers not useable.
Drive is not recognized by system during Boot process, but is recognized by the Operating System (i.e. XP, Win2000, Win98, Win NT, etc.)	• Is the DVD Rewriteable drive software driver loaded? On a step-by-step (F8) Boot of the system is the DVD Rewriteable drive recognized? (BIOS / DOS reports "device driver not found" or "no valid DVD drivers selected."). If not, Contact Technical Support. • Has the Windows DVD Rewriteable drive software driver program been corrupted by a virus. Run a Virus Scan program and repair if possible. Contact Technical Support if the Virus renders the software drivers not useable.
BUSY Indicator LED flashes slowly	• The disc may be dirty Clean it with a soft damp cloth. Avoid cleaning the disc using a circular motion. The disc should be wiped in a radial direction. That is, from the inner side outward. • The laser lens may have become cloudy or blocked by particulate matter. Please contact Technical Support.
BUSY Indicator LED is constantly ON	• Possible Hardware Problem. Please contact Technical Support.
DVD-ROM can not play a DVD in the drive or certain types of CD media (i.e. CD-plus, etc.)	• Is the DVD Rewriteable drive driver loaded • Is the DVD disc the correct format for the type of system that you are using? (i.e. on a PC an ISO9660 IBM compatible PC format as opposed to Apple/Mac HFS disc or UNIX disc formats which will not function). • Do you have the correct software applications program/drivers installed to run a DVD disc? • Has the Windows DVD Rewriteable drive software driver program been corrupted by a virus. Run a Virus Scan program and repair if possible. Contact Technical Support if the Virus renders the software drivers not useable.

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SPECIFICATIONS –SD-R6472

General

Interface: ATAPI

Applicable Write Format

DVD-R	Disc at once, Incremental write
DVD-RW	Disc at once, Incremental write, Restricted overwrite
DVD+R	Sequential Write
DVD+RW	Sequential Write, Random Write
CD-R/-RW	Disc at once, Track at once, Session at once, Packet write

Applicable Write disc

DVD-R	DVD-R (Ver 2.0 & 2.1 for General)
DVD-RW	DVD-RW (Ver1.1 & Ver 1.2)
DVD+R	DVD+R (4.7GB Basic Format Spec, Ver 1.3)
DVD+RW	DVD+RW (4.7GB Basic Format Spec, Ver 1.2)
CD-R/-RW, HS CD-RW, US CD-RW	CD-DA, CD+(E)G, CD-MIDI, CD-ROM, CD-ROM XA, CD-I, MIXED MODE CD, CD-I Bridge (Photo-CD, Video-CD), Multi-session CD (Photo-CD, CD-Extra, Portfolio)

Applicable Read Formats:

DVD	DVD-ROM (DVD-5, DVD-9, DVD-10, DVD-18), DVD-R (Ver. 1. for Authoring, Ver. 2.0 & Ver 2.1 for General, DVD-RW (Ver. 1.2, Ver. 1.1), DVD+R (4.7GB Basic Format Spec. Ver. 1.3), DVD+RW (Ver 1.2), DVD-RAM (Ver. 2.1)
CD	CD-DA, CD+(E)G, CD-MIDI, CD-TEXT, CD-ROM, CD-ROM XA, CD-I, CD-I Bridge (Photo-CD, Video-CD), Multi-session (Photo CD, CD-Extra, CD-R, CD-RW, Portfolio)

Note: All DVD/CD formats, except CD-Red Book (audio), require additional application specific software and/or hardware. The drive is capable of reading these data formats. However, in order to run applications that use these formats, you must first have the required software and/or hardware.

Data Disc Capacities

DVD-ROM	4.377GB (DVD-5) 7.959GB (DVD-9) 8.754GB (DVD-10) 15.917GB (DVD-18)
DVD-R (Ver 1)	3.679GB
DVD-R (Ver 2.0)	4.377GB
DVD-RW	4.377GB
DVD+R	4.377GB
DVD+RW	4.377GB
DVD-RAM (Ver 2.1)	4.377GB
CD	656.5MB (mode 1) 748.8MB (mode 2)

Performance

Rotational Speed

DVD-ROM (single layer)	4,670rpm (3.3 - 8X CAV)
DVD-ROM (dual layer)	3,792rpm (2.5 - 6X CAV)
DVD-R (Ver. 1.0)	4,670rpm (3.3 - 8X CAV)
DVD-R (Ver. 2.X)	4,670rpm (3.3 - 8X CAV)
DVD-RW (Ver 1.X)	3,792rpm (2.4 - 6X CAV)
DVD+R	4,670rpm (3.3 - 8X CAV)
DVD+RW	3,792rpm (2.4 - 6X CAV)
DVD-RAM (Ver 2.1)	1,400 - 3,300rpm (2X ZCLV)
DVD-R (Ver 2.1) (Write)	1,140 - 2,780rpm (2X CLV)
DVD-RW (Ver 1.1) (Write)	2,300 - 3,980rpm (2X/4X ZCLV) 570 - 1,390rpm (1X CLV)
DVD+R (Write)	1,140 - 2,780rpm (2X CLV) 1,380 - 3,330rpm (2.4X CLV)
DVD+RW (Write)	2,300 - 3,980rpm (2.4X, 4X ZCLV) 1,380 - 3,330rpm (2.4X CLV)
CD-ROM, CD-R	5,100rpm (10.3 - 24X CAV)
CD-RW	5,100rpm (10.3 - 24X CAV)
Ultra Speed CD-RW	5,100rpm (10.3 - 24X CAV)
High Speed CD-RW	5,100rpm (10.3 - 24X CAV)
CD-DA Transfer	5,100rpm (10.3 - 24X CAV)
CD-DA, Video-CD	1,200 - 2,000rpm (4 - 6X PCAV)
CD-R (Write)	850 - 1,980rpm (4X CLV) 1,700 - 3,960rpm (8X CLV) 2,648 - 3,960rpm (8/12/16X ZCLV)
CD-RW (Write)	850 - 1,980rpm (4X CLV)
Ultra Speed CD-RW (Write)	3,125 - 4,950rpm (10X CLV)
High Speed CD-RW (Write)	3,125 - 4,950rpm (10X CLV) 850 - 1,980rpm (4X CLV)

Transfer Rate

DVD (Single)	4,416 - 10,816KB/second
DVD (Dual)	3,380 - 8,112KB/second
DVDR	4,420 - 10,800KB/second
DVDRW	3,380 - 8,112KB/second
DVD-RAM (Ver 2.1)	2,740KB/second
CD	1,545 - 3,600KB/second (mode 1) 600 - 900KB/second (mode 1) 1,761 - 4,104KB/second (mode 2) 684 - 1,026KB/second (mode 2)
CD-RW	1,545 - 3,600KB/second (mode 1) 1,761 - 4,104KB/second (mode 2)

Random Access Time

DVD	120ms
CD	105ms
DVD-RAM	250ms

Data Error Rate

DVD-ROM	10^{-15} Max
CD-ROM	10^{-15} Max (Mode 1) 10^{-12} Max (Mode 2)

Data Buffer	2MB

Reliability

MTBF	60,000 hours
Power ON Hours	5,436 hours/year
ON/OFF Cycles	313 cycles/year
Number of Access	600,000 accesses/year
Operating Duty Cycle	20% of Power ON time (Reading/Seeking) 2% of Power ON time (Writing/Seeking)
MTTR	0.5 hours

Environmental

Ambient Temperature	
Operating	5° to 50° C (41° to 122° F)
Storage	-10° to 60° C (14° to 140° F)
Shipping	-40° to 65° C (-40° to 149° F)
Temperature Gradient	
Operating	11° C /hour (max)
Storage/Shipping	20° C /hour (max)

Relative Humidity	
Operating	8% to 80%
Storage/Shipping	5% to 95% (wet bulb 40 C max)
Vibration	
Operating (5 to 500 Hz) (read)	2.45 m/s^2 (0.25G) (O-P)
Operating (5 to 500Hz) (write)	2.45 m/s^2 (0.25G) (O-P)
Non-operating (10 to 500Hz)	9.8 m/s^2 (1.0G) (O-P)
Transporting (with packing) (10 to 25 Hz)	9.8 m/s^2 (1.0G) (O-P)
Shock (Non-operating)	490 m/s^2 [50G]
Acoustical Noise	40dB

Power

DC Voltage and Current Requirements	+5V ±5% (Operating)

Physical

Height	0.5" (12.7mm)
Width	5.04" (128mm)
Depth	4.96" (126.1mm)
Weight	6.7oz (.19kg)

Connectors

IDE Interface Connector	50 Pin I/F ATAPI Standard

Regulatory

The SD-R6472 DVD Writeable drive has been certified by the following regulatory agencies:

- UL 1950
- CSA C22.2 No. 950
- TUV (EN60950I)
- CE standard
- DHHS 21 CFR Sub-Chapter J
- FDA CFR21, EN60825

Drive Connectors –SD-R6472

Figure 1.SD-R6472 DVD Writeable Drive Rear Panel – Connector

ATAPI Connector A 50-pin ATAPI interface connector is found at the rear of the SD-R6472 DVD rewriteable drive. Connecting cable should use Japan Aviation Electronics Industry Limited KX14-50Series L or equivalent connector.

Table 1.Interface Pin Assignments

PIN NO.	I/O	SIGNAL NAME	PIN NO.	I/O	SIGNAL NAME
1	O	Audio L-CH	2	O	Audio R-CH
3		Audio Ground	4		Digital Ground
5	I	/RESET	6	I/O	DD8
7	I/O	DD7	8	I/O	DD9
9	I/O	DD6	10	I/O	DD10
11	I/O	DD5	12	I/O	DD11
13	I/O	DD4	14	I/O	DD12
15	I/O	DD3	16	I/O	DD13
17	I/O	DD2	18	I/O	DD14
19	I/O	DD1	20	I/O	DD15
21	I/O	DD0	22	O	DMARQ
23		Ground	24	I	/DIOR: / HDMARDT: HSTROBE
25	I	/DIOW:STOP	26		Ground
27	O	IORDY: / DDMARDY: DSTROBE	28	I	/DMACK
29	O	INTRQ	30	O	/IOCS16
31	I	DA1	32	I/O	/PDIAG
33	I	DA0	34	I	DA2
35	I	/CS1FX	36	I	/CS3FX
37	I/O	/DASP	38	I	+5V (Motor)
39	I	+5V (Motor)	40	I	+5V (Motor)
41	I	+5V (Logic)	42	I	+5V (Logic)
43		Ground	44		Ground
45		Ground	46		Ground
47	I	CSEL	48		Ground
49	I	Vendor Unique*	50	I	Vendor Unique*
**Vender Unique, don't connect pins*					